

## WHAT WE CLAIM IS:

1. A process comprising contacting 1,3-propanediol with a suitable polymerization catalyst to produce polytrimethylene ether glycol,  
5 wherein the 1,3-propanediol, before contact, comprises about 10 microg/g or less peroxide compounds, based on the weight of 1,3-propanediol.
2. The process of claim 1, wherein the 1,3-propanediol further comprises about 100 microg/g or less carbonyl compounds based on the  
10 weight of the PDO.
3. The process of claim 1, wherein the 1,3-propanediol further comprises about 100 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.  
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4. The process of claim 2, wherein the 1,3-propanediol further comprises about 100 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.
- 20 5. The process of claim 1, wherein the 1,3-propanediol further comprises about 75 microg/g or less carbonyl compounds based on the weight of the PDO.
6. The process of claim 1, wherein the 1,3-propanediol further comprises about 75 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.  
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7. The process of claim 5, wherein the 1,3-propanediol further comprises about 75 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.  
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8. The process of claim 1, wherein the 1,3-propanediol further comprises about 50 microg/g or less carbonyl compounds based on the weight of the PDO.

5 9. The process of claim 1, wherein the 1,3-propanediol further comprises about 50 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.

10 10. The process of claim 8, wherein the 1,3-propanediol further comprises about 50 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.

15 11. The process of claim 1, wherein the 1,3 –propanediol further comprises about 25 microg/g or less carbonyl compounds based on the weight of the PDO.

12. The process of claim 1, wherein the 1,3-propanediol further comprises about 25 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.

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13. The process of claim 11, wherein the 1,3 propanediol further comprises about 25 microg/g or less monofunctional alcohol compounds based on the weight of the PDO.

25 14. The process of claim 1, wherein the 1,3-propanediol is at least 99.95% pure.

15. The process of claim 1, wherein the 1,3-propanediol comprises biochemically-derived 1,3-propanediol.

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16. The process of claim 15, wherein the 1,3-propanediol is derived from a fermentation process.

17. The process of claim 16, wherein the 1,3-propanediol is derived from a fermentation process using a renewable biological source.

18. The process of claim 17, wherein the 1,3-propanediol is  
5 produced from corn feed stock.

19. The process of claim 1, wherein the 1,3-propanediol has a color value of less than about 10 APHA.

10 20. The process of claim 1, wherein the 1,3-propanediol has a color value of less than about 5 APHA.

15 21. The process of claim 1, wherein the 1,3-propanediol has a color value less than about 15 APHA when treated with 1 wt. % sulfuric acid at 170 degrees C. for 10 minutes.

22. The process of claim 1, wherein the polytrimethylene ether glycol has a color of less than about 50 AHPA.

20 23. The process of claim 22, wherein the polytrimethylene ether glycol has a color of less than 30 AHPA.

24. The process of claim 22, wherein the polytrimethylene ether glycol has a molecular weight of from about 250 to about 5000.

25 25. The process of claim 1, wherein the polytrimethylene ether glycol comprises a homopolymer.

30 26. The process of claim 1, wherein the polytrimethylene ether glycol comprises a copolymer.

27. The process of claim 1, wherein the polytrimethylene ether glycol comprises a copolymer of 1,3-propanediol with at least one other C<sub>6</sub> to C<sub>12</sub> diol.

5 28. The process of claim 1, wherein the 1,3-propanediol has a 50/50 pH of about 6.0-7.5.

29. The process of claim 1, wherein the 1,3 propanediol has a 50/50 pH of about 6.0-7.0.

10 30. A process comprising:  
contacting a biochemically-derived 1,3-propanediol with a suitable polymerization catalyst to produce polytrimethylene ether glycol, wherein the 1,3-propanediol has a 50/50 pH of about 6.0 – 7.5 and comprises  
15 about 100 microg/g or less carbonyl compounds, about 10 microg/g or less peroxide compounds and about 100 microg/g or less monofunctional alcohol compounds.

31. The process of claim 30, wherein the 1,3-propanediol has a  
20 color of less than about 10 APHA.

32. A composition comprising: 1,3-propanediol, about 100 microg/g or less carbonyl compounds, about 10 microg/g or less peroxide compounds and about 100 microg/g or less monofunctional alcohol  
25 compounds, based on the weight of 1,3-propanediol.

33. The composition of claim 32, wherein the propanediol is at least 99.95% pure.

30 34. A composition comprising: biochemically-derived 1,3-propanediol, wherein the 1,3-propanediol comprises about 100 microg/g or less carbonyl compounds, about 10 microg/g or less peroxide compounds

and about 100 microg/g or less monofunctional alcohol compounds, based on the weight of 1,3-propanediol.

35. The composition of claim 34, wherein the 1,3-propanediol is  
5 derived from a renewable source.

36. The composition of claim 35, wherein the 1,3-propanediol is  
derived from a corn feed stock.

10 37. Polytrimethylene ether glycol derived from the polymerization  
of biochemically-derived 1,3-propanediol.